Cannabis Control Commission
COMMONWEALTH OF MASSACHUSETTS

Energy and Environment Compiled Guidance

January 2020

Massachusetts Cannabis Control Commission:

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Contents

I. Overview and Applicability

This guidance is not legal advice. It is meant to assist licensed Marijuana Establishments (MEs) with developing energy efficiency and environmental best practices, and to comply with state laws and regulations. Please consult an attorney if you have any questions regarding the legal requirements that apply.

II. Energy

A. Guidance on Basic Energy Efficiency Practices & Reporting for Marijuana Establishments

The following guidance is provided to assist applicants seeking to be licensed as an adult-use ME under 935 CMR 500.000: Adult Use of Marijuana. This guidance also applies to Medical Marijuana Treatment Centers (MTCs, formerly known as Registered Marijuana Dispensaries), seeking to be licensed under 935 CMR 501.000: Medical Use of Marijuana. Please note that Cultivation Facilities, whether licensed as an ME or MTC (ME/MTC), must also comply with additional requirements set forth in *Guidance on Energy Efficiency Standards & Reporting for Cultivation Facilities [see page 10]*.

All applications submitted on or after July 1, 2020, if they are not otherwise exempted, must comply with the energy efficiency standards and reporting requirements described in this guidance. This guidance is not legal advice. If you have questions regarding the legal requirements for licensure in the Commonwealth, you are encouraged to consult an attorney. An ME/MTC is responsible for complying with any revisions to this guidance that may be issued if legal or regulatory requirements change.

Applicants

Consideration of energy efficiency and conservation should occur during the application process and throughout the operational life of a facility. During the application process, an ME/MTC must submit a summary of their written operating procedures regarding energy efficiency and conservation as part of their Management and Operation Profile in accordance with 935 CMR 500.101(1)(c)10. and 500.105(15), or 935 CMR 501.101(1)(c)10. and 501.105(15). As part of the Architectural Review process, additional information should be submitted at the same time as building plans after receipt of a Provisional License. Please note that applicants seeking a Transporter or Delivery license have different issues, which are addressed in a separate section below.

An ME/MTC is required[1] to engage in:

> *(1) Identification of potential energy-use reduction opportunities (such as natural lighting and energy efficiency measures), and a plan for implementation of such opportunities;*

[1] 935 CMR 500.105(1)(q) & 500.105(15); 935 CMR 501.105(1)(q) & 501.105(15).

(2) Consideration of opportunities for renewable energy generation, including, where applicable, submission of building plans showing where energy generators could be placed on the site, and an explanation of why the identified opportunities were not pursued, if applicable;

(3) Strategies to reduce electric demand (such as lighting schedules, active load management, and energy storage); and

(4) Engagement with energy efficiency programs offered pursuant to M.G.L. c. 25, § 21, or through municipal lighting plants.

The guidance will go through each item above.

Identification of potential energy-use reduction opportunities and a plan for implementation of such opportunities.

There are many opportunities in an ME/MTC to reduce energy usage and costs through energy efficient equipment and operations. Lighting is a major energy user in everything from retail spaces, to cultivation, and back-office operations. Heating and air conditioning are also large drivers of energy use for all buildings in the Northeast. It is recommended that the design team for an ME/MTC include energy professionals who will review facility and equipment needs and make recommendations for optimal facility equipment choices based on energy usage.

The applicant must address how its written operating procedures in the Management and Operations Profile packet will incorporate the following elements:

- Description of how the ME/MTC will monitor energy consumption and make adjustments to operations based on energy-usage data;
- Procedures for identifying energy savings opportunities as part of any facility upgrades, renovations, or expansions; and
- Procedures for identifying energy savings opportunities when equipment fails and needs to be replaced.

At the Architectural Review stage, further information should be submitted to demonstrate actual consideration of energy reduction opportunities, including a list of energy reduction opportunities that were considered. Information should include whether opportunities are being implemented, will be implemented at a later date, or not planning to be implemented. An ME/MTC should also include a summary of information that was considered to make the decision (i.e. costs, available incentives, and bill savings). As a general matter, submission of a Mass Save® or municipal light plant (MLP) audit report or rebate applications should suffice to demonstrate compliance with this item.

Consideration of opportunities for renewable energy generation, including, where available, submission of building plans showing where energy generators could be placed on the site, and an explanation of why the identified opportunities were not pursued, if applicable.

Renewable energy such as solar panels, wind turbines, and renewable thermal can reduce and stabilize energy costs for an ME/MTC. The applicant must address how its written operating procedures in the Management and Operations Profile packet will incorporate the following elements:

- Description of how the ME/MTC will make energy supply decisions and regularly evaluate renewable options;
- Procedures for identifying renewable or alternative energy opportunities as part of any facility upgrades, renovations, or expansions; and
- Procedures for identifying renewable or alternative energy opportunities when equipment fails and needs to be replaced.

At the Architectural Review stage, further information should be submitted to demonstrate actual consideration of renewable energy generation opportunities, including a list of renewable or alternative energy reduction opportunities that were considered. Information should include whether opportunities:

- are being implemented;
- will be implemented at a later date; or
- are not planned to be implemented.

An ME/MTC should include a summary of information that was considered to make a decision (i.e. costs, available incentives, and bill savings). ME/MTCs should consider incentives through programs which can help offset costs of renewable and alternative energy installation, such as:

- Massachusetts Department of Energy Resources' Solar Massachusetts Renewable Target (SMART) (http://masmartsolar.com/);
- Renewable Portfolio Standard (https://www.mass.gov/guides/rps-class-i-and-class-ii-statement-of-qualification-application); and
- Alternative Portfolio Standard (https://www.mass.gov/guides/aps-renewable-thermal-statement-of-qualification-application; https://www.mass.gov/guides/apply-to-the-aps-chp-flywheel-storage-and-fuel-cells).

Strategies to reduce electric demand (such as lighting schedules, active load management, and energy storage).

Demand is how much electricity an ME/MTC can use at a given time in its facility – more demand means more electricity capacity is needed, and an ME/MTC pays for this capacity on electricity bills.

The applicant must address how its written operating procedures in the Management and Operations Profile packet will incorporate the following elements:

- Description of how the ME/MTC will monitor energy demand and make adjustments to operations based on data; and

- Procedures for participation in load curtailment, energy storage, or other active demand management programs (as applicable).

At the Architectural Review stage, further information should be submitted to demonstrate actual consideration of demand reduction opportunities, including whether opportunities are being implemented, will be implemented at a later date, or not planning to be implemented. Include a summary of information that was considered to make a decision (i.e. costs, available incentives, and bill savings). As a general matter, submission of a Mass Save® or MLP audit report or rebate applications should suffice to demonstrate compliance with this item.

Engagement with energy efficiency programs offered pursuant to M.G.L. c. 25, § 21, or through municipal lighting plants.

The Mass Save® programs (https://www.masssave.com/en/saving/business-rebates/) provide financial incentives for energy efficiency and demand reduction measures, including efficient lighting, heating ventilation and air conditioning (HVAC), and other equipment. These programs are available to homes and businesses across the Commonwealth. For communities where Mass Save® is not available, please engage with the local MLP (http://www.mmwecgoprogram.org, https://www.ene.org/energy-efficiency/).

The applicant must address how its written operating procedures in the Management and Operations Profile packet will incorporate regular engagement with energy efficiency programs (account representative, vendors, etc.) to ensure awareness of new opportunities and incentives. At the Architectural Review stage, further information should be submitted to demonstrate actual engagement with energy efficiency (Mass Save® or MLP) programs and any financial incentives received. As a general matter, submission of a Mass Save® or MLP audit report or rebate applications should suffice to demonstrate compliance with this item.

Transporters and Delivery

Transporters and delivery operators are different from other license types because their energy use is derived primarily from vehicles instead of buildings.

Vehicles that use alternative fuels – such as biodiesel, electricity, and natural gas – help to reduce carbon emissions and increase our energy security. In the Management and Operations profile, the applicant must describe how it will make fleet decisions and affirm that it will regularly evaluate alternative fuel vehicle options. At the Architectural Review stage, the applicant must submit a narrative describing the process the Transporter or Delivery operation used to select vehicles to be used in operations, and if alternative fuel vehicles are not being used, a detailed explanation of why other vehicle fuel sources were selected. A description of any other energy and water conservation strategies employed at the physical facility for transportation and delivery (e.g. garage, dispatch) should also be included.

Conclusion

Application sections pertaining to energy are reviewed for compliance with 935 CMR 500.000 & 501.000 and for completeness. The regulations and guidance are designed to ensure that an ME/MTC considers how to optimally use energy early in the facility design process, and continually assess new opportunities for reduced energy usage and costs. Licensees should use best management practices to reduce energy and water usage, engage in energy conservation, and mitigate other environmental impacts. Licensees are also required to meet all applicable environmental laws, regulations, permits, and other applicable approvals, including those related to water quality and solid and hazardous waste management, prior to obtaining a final license. At this time, the Cannabis Control Commission (Commission) deems compliance with the operational requirements of the regulations, as described above, to constitute best management practices as related to energy usage and conservation. Cultivation facilities should maintain policies and procedures addressing all efforts to mitigate environmental impacts, as required under 935 CMR 500.120(12)(e) and 935 CMR 501.120(13)(e). Applicants will be responsible for complying with any revisions to this guidance that may be issued if legal or regulatory requirements change.

Other Resources

License applicants can use this guidance to learn more about how to comply with the energy usage requirements set forth in the following sections of 935 CMR 500.000 and 501.000:

- 935 CMR 500.040(3)(c) – Energy and Environmental Leader Award
- 935 CMR 500.103(1)(b) & 501.103(1)(a) – Architectural Review, Energy Letters
- 935 CMR 500.103(1)(f) & 501.103(1)(e) – Provisional License, Energy Letters
- 935 CMR 500.103(4)(c),(d) & 501.103(4)(c),(d) – Renewal, Energy Letters
- 935 CMR 500.105(1)(q) & 501.105(1)(q) – Written Operating Procedures
- 935 CMR 500.105(13)(h) & 501.105(13)(h) – General Operating Requirements / Transporters
- 935 CMR 500.105(15) & 501.105(15) – General Operating Requirements / Energy Efficiency and Conservation
- 935 CMR 500.120(11) – Marijuana Cultivators
- 935 CMR 501.120(11) – Additional Operational Requirements for the Cultivation, Acquisition, and Distribution of Marijuana
- 935 CMR 500.130(3) & (5)(e) – Marijuana Product Manufacturers
- 935 CMR 501.130(3) – Additional Operational Requirements for Handling and Testing Marijuana and for Production of Marijuana-Infused Products (MIPs)

B. Guidance on Energy Efficiency Standards & Reporting for Cultivation Facilities

The following guidance is provided to assist indoor cultivation facilities, whether they are licensed as a Craft Cooperative, Microbusiness, or Marijuana Cultivator under 935 CMR 500.000*: Adult Use of Marijuana*, or as an MTC to cultivate cannabis under 935 CMR 501.000: *Medical Use of Marijuana*. All relevant entities are referenced as "Cultivation Facilities" in this guidance. Indoor operations associated with outdoor cultivation are also subject to these requirements. Please note that Cultivation Facilities must also meet the requirements in the *Guidance on Basic Energy Efficiency Practices & Reporting for Marijuana Establishments [see page 4]*.

This guidance, in conjunction with applicable regulations, establish the requirements for licensure in the Commonwealth. This guidance is not legal advice. If you have questions regarding the legal requirements for licensure in the Commonwealth, you are encouraged to consult an attorney. Cultivators are responsible for complying with any revisions to this guidance that may be issued if legal or regulatory requirements change.

Applicability

All applications for initial licensure or renewal submitted on or after July 1, 2020, if they are not otherwise exempted, must comply with the energy efficiency standards and reporting requirements described in this guidance. A co-located ME and MTC with a final Certificate of Licensure before November 1, 2019 shall have until July 1, 2020 to comply with 935 CMR 500.120(11), except that any additions to or renovations to a facility must comply with 935 CMR 500.120(11). An MTC with a final Certificate of Licensure before November 1, 2019 and that is not co-located with an ME shall have until January 1, 2021 to comply with 935 CMR 501.120(11), except that any additions to or renovations to a facility must comply with 935 CMR 501.120(11). An ME or MTC may apply for an additional six-month extension beyond the date applicable to it, if it agrees to install meters to monitor energy usage, water usage, and other data determined by the Commission, as well as provide reports on energy usage, water usage, waste production and other data in a form and manner determined by the Commission.

Overview

Cannabis cultivation uses significant energy, primarily because of three energy uses: (i) horticultural lighting; (ii) dehumidification; and (iii) HVAC. To mitigate the impact of increased energy usage, and associated costs and greenhouse gas emissions, specific operational requirements have been adopted for Cultivation Facilities in the adult-use and medical-use marijuana regulations.[2]

To document compliance with the energy efficiency requirements of the regulations, materials must be submitted at three different points in the licensure/renewal process and be maintained throughout operations:

- Application: A Cultivation Facility must maintain written operating procedures that demonstrate compliance with the energy efficiency standards in the regulations. A summary of such procedures must be submitted as part of the Management and Operations Profile[3];

- Architectural Review: As part of the Architectural Review process, building and equipment information should be submitted at the same time as building plans after receipt of a Provisional License;[4] and

- Operations & Renewal: A Cultivation Facility must continue to maintain written operating procedures on energy usage for the duration of its operations. When it comes time for renewal, a Cultivation Facility must provide information regarding its energy and water consumption usage.[5] This information must be included every year that a renewal application is submitted.

[2] 935 CMR 500.120 (11) & (12); 935 CMR 501.120 (11) & (12).
[3] 935 CMR 500.101(1)(c)(10) & 500.120(12)(e); 935 CMR 501.101(1)(c)(10) & 501.120(13)(e).
[4] 935 CMR 500.103(1); 935 CMR 501.103(1).
[5] 935 CMR 500.103(4)(c) & 120(11); 935 CMR 501.103(4)(c) & 120(11).

Application: Demonstrating Compliance with Energy Efficiency Standards in the Management and Operations Profile

Cultivation Facilities must, in addition to the other materials submitted as part of the Management and Operations Profile, submit a summary of their written operating procedures that demonstrate compliance with energy efficiency standards.[6] Please complete the basic summary required in the *Guidance on Basic Energy Efficiency Practices & Reporting for Marijuana Establishments [see page 4]*. In addition to the basic summary required of all MEs, a Cultivation Facility must address how its written operating procedures will incorporate the following additional elements:

1. How the cultivator will ensure on a regular basis that equipment is maintained, calibrated and operating properly, including maintain operations manuals and operating procedures for all major energy using equipment, including, but not limited to horticultural lighting, HVAC systems, dehumidification systems.

2. How the cultivator regularly assesses opportunities to reduce energy and water usage, which should include:

    a. Identification of potential energy use reduction opportunities (such as natural lighting and energy efficiency measures), and a plan for implementation of such opportunities;

    b. Consideration of opportunities for renewable energy generation, including, where applicable, identification of building plans, available upon inspection, showing where energy generators could be placed on the site, and an explanation of why the identified opportunities were not pursued, if applicable;

    c. Strategies to reduce electric demand (such as lighting schedules, active load management, and energy storage); and

    d. Engagement with energy efficiency programs offered pursuant to M.G.L. c. 25, § 21, or through municipal lighting plants.

[6] 935 CMR 500.101(1)(c)(10) & 500.120(12)(e); 935 CMR 501.101(1)(c)(10) & 501.120(13)(e).

Architectural Review: Letters and Supporting Documentation

As part of the Architectural Review process, Cultivation Facilities must document compliance with the energy requirements by submitting an energy compliance letter prepared by a Massachusetts Licensed Professional Engineer or Massachusetts Licensed Registered Architect with supporting documentation, together with submission of building plans.

For a Microbusiness or Craft Marijuana Cooperative with a cultivation location sized as Tier 1 or Tier 2, or such other Cultivation Facilities meeting the requirements of 935 CMR 500.850: *Waivers*, there are additional options. They may demonstrate compliance with any of the requirements of 935 CMR 500.120(11) through an energy compliance letter or updated energy compliance letter prepared by one or more of the following energy professionals:

1. A Certified Energy Auditor certified by the Association of Energy Engineers;
2. A Certified Energy Manager certified by the Association of Energy Engineers;
3. A Massachusetts Licensed Professional Engineer; or
4. A Massachusetts Licensed Registered Architect.

In addition, all facilities regardless of compliance path shall provide third-party safety certification for lighting products by an Occupational Safety and Health Administration (OSHA), Nationally Recognized Testing Laboratory (NRTL), or Standards Council of Canada (SCC)-recognized body, which shall certify that the products meet a set of safety requirements and standards deemed applicable to horticultural lighting products by that safety organization.

The following paragraphs provide guidance regarding the necessary components of the contents of the Energy Compliance Letter.

Building Envelope

A building envelope is what separates the outside from the inside of a building. Building envelope items include insulation, roofs, windows, doors, walls, etc. Having a tight building envelope is fundamental to good energy performance. Poor performing building envelopes results in wasted energy, increase energy costs, and may have ancillary impacts like neighbor smell complaints.

The regulations identify specific ways to demonstrate compliance regarding a Marijuana Establishment's building envelope as follows:[7]

[7] 935 CMR 500.120(11)(a); 935 CMR 501.120(12)(a).

> The building envelope for all facilities, except greenhouses, must meet minimum Massachusetts Building Code requirements and all Massachusetts amendments (780 CMR: State Building Code), International Energy Conservation Code (IECC) Section C.402, or The American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) Chapters 5.4 and 5.5 as applied or incorporated by reference in 780 CMR: State Building Code, except that facilities using existing buildings may demonstrate compliance by showing that the envelope insulation complies with code minimum standards for Type Factory Industrial F-1, as further defined in guidelines issued by the Commission.

An Energy Compliance Letter submitted as part of the Architectural Review must include a narrative confirming compliance with the building envelope requirements and the output from COMcheck™ software used to show building envelope compliance with Massachusetts Building Code, 780 CMR.

Lighting

When discussing horticultural lighting, it is helpful to be aware of the following definitions in the regulations:[8]

> Canopy means an area to be calculated in square feet and measured using clearly identifiable boundaries of all areas(s) that will contain mature plants at any point in time, including all of the space(s) within the boundaries, Canopy may be noncontiguous, but each unique area included in the total Canopy calculations shall be separated by an identifiable boundary which include, but is not limited to: interior walls, shelves, greenhouse walls, hoop house walls, garden benches, hedge rows, fencing, garden beds, or garden plots. If mature plants are being cultivated using a shelving system, the surface area of each level shall be included in the total Canopy calculation.
>
> Horticultural Lighting Equipment (HLE) means any lighting equipment (e.g. fixtures, bulbs, ballasts, controls, etc.) that uses energy for the cultivation of plants, at any stage of growth (e.g. germination, cloning/mother plants, propagation, vegetation, flowering, and harvest).
>
> Horticulture Lighting Square Footage (HLSF) means Canopy.
>
> Horticulture Lighting Power Density (HLPD) is a measure of total watts of HLE per total Horticulture Lighting Square Footage (HLE / HLSF = HLPD), expressed as number of watts per square foot.

[8] 935 CMR 500.002, 500.120(11)(h) and 501.120(12)(g).

Indoor and some greenhouse cultivators use HLE to grow plants. These lights are very powerful and have significantly higher energy use and light intensity compared to typical screw-in light bulbs. As there are numerous horticultural lighting technology options, the regulations set forth two lighting compliance options to provide flexibility for Cultivators to make technology decisions that meet the requirements.[9]

It is important to note that long-term exposure to horticultural lighting may impact vision. Eye safety protocols must be established prior to the time of initial operations and regularly updated and implemented as part of the Cultivation Facility's detailed written operating procedures.

These eye protection requirements are in addition to any other safety protocols required under state, federal, or local law (e.g. OSHA).

Cultivators must demonstrate compliance with either: (1) the HLPD standard; or (2) the Horticultural Lighting Qualified Product List (Horticultural QPL):

1. HLPD: HLPD must not exceed 36 watts per gross square foot, but for Tier 1 and Tier 2 which must not exceed 50 watts per square foot.

   HLPD is a measure of total watts of Horticultural Lighting Equipment per total Horticulture Lighting Square Footage, expressed as number of watts per square foot.
   (HLE / HLSF = HLPD)

2. Horticultural QPL: All horticultural lighting used in a facility must be:

   a. listed on the current Design Lights Consortium Solid-State Horticultural QPL or other similar list approved by the Commission as of the date of license application, AND

   b. lighting Photosynthetic Photon Efficacy (PPE) is at least 15 percent above the minimum Horticultural QPL threshold rounded up to the nearest 0.1 micromoles per joule (μmol/J).

The HLPD Energy Compliance Letter submitted as part of the Architectural Review must contain the following regarding horticultural lighting:

1. The letter must include the calculations that show compliance with the HLPD requirements;

[9] 935 CMR 500.120 (11)(b); 935 CMR 501.120 (12)(b).

2. Narrative explanation of how the facility complies with 935 CMR 500.120(11)(b) or 501.120(12)(b), supported by copies of the facility lighting schedule, square footage of canopy, description of HLE, number, type, and wattage of all HLE;

3. Cutsheets for all HLE to be submitted as part of the Architectural Review;

4. Detailed identification of the stamped plans showing the layout of all HLE, which means any lighting equipment (e.g. fixtures, bulbs, ballasts, controls, etc.) that uses energy for the cultivation of plants, at any stage of growth (e.g. germination, cloning/mother plants, propagation, vegetation, flowering, and harvest), such plans must be available immediately upon inspection and two copies of the plans must be available for immediate surrender upon request;

5. Detailed identification of the stamped plans showing the areas considered as HLSF, such plans must be available immediately upon inspection and two copies of the plans must be available for immediate surrender upon request;

6. Description of an eye safety plan that includes the following:

    a. Safety protocols related to eye safety for those exposed to horticultural lighting;

    b. Communication plan for how eye safety protocols will be communicated to employees;

    c. Description of how protective eyewear will be provided for anyone coming in to contact with active horticultural lights;

    d. Description of signage that will be used to remind workers of eye safety;

    e. Affirmation that the safety protocols will be reviewed and updated by the Cultivation Facility on an annual basis.

The Horticultural QPL Energy Compliance Letter submitted as part of the Architectural Review must contain the following regarding horticultural lighting:

1. Narrative explanation of how the facility complies with 935 CMR 500.120(11)(b) or 501.120(12)(b), supported by copies of the facility lighting schedule, square footage of canopy, description of HLE, number, type and wattage of all HLE;

2. Cutsheets for all HLE to be submitted as part of the Architectural Review;

3. Description of an eye safety plan that includes the following:

    a. Safety protocols related to eye safety for those exposed to horticultural lighting;

    b. Communication plan for how eye safety protocols will be communicated to employees;

    c. Description of how protective eyewear will be provided for anyone coming in to contact with active horticultural lights;

    d. Description of signage that will be used to remind workers of eye safety;

    e. Affirmation that the safety protocols will be reviewed and updated by the Cultivation Facility on an annual basis.

HVAC & Dehumidification Systems

HVAC as well as dehumidification are primary drivers of energy use in a Cultivation Facility. Air conditioning is used to cool the air to offset heat generated from lighting. Dehumidification is necessary to remove water, used by plants, from the air.

The regulations[10] require HVAC and dehumidification systems to meet Massachusetts Building Code requirements, 780 CMR, which in turn incorporates Chapter 403 of the International Energy Conservation Code (IECC) and Chapter 6 of the American Society of Heating, Refrigerating and Air-Conditioning Engineers Handbook. To demonstrate compliance, a Cultivation Facility must provide a certification from a Massachusetts Licensed Mechanical Engineer that the HVAC and dehumidification systems meets the Massachusetts State Building Code as specified in the regulations and that such systems have been evaluated and sized for the anticipated loads of the facility.

The Professional Engineer (PE) providing the Energy Compliance Letter may also serve as a Licensed Mechanical Engineer, if the PE license covers mechanical engineering. The letter must include the following information:

- Certification from a Massachusetts Licensed Mechanical Engineer that the HVAC and dehumidification systems meet the Massachusetts State Building Code, and that HVAC and dehumidification equipment have been evaluated and sized for the loads of the facility;

[10] 935 CMR 500.120(11)(c); 935 CMR 501.120(12)(c).

- Total of tons of refrigeration (TR), thousands of British thermal units (BTUs) per hour (MBH), and a listing of all HVAC equipment to be installed. The information provided in the letter must be supported by equipment data sheets available immediately upon request.

- Total of tons of dehumidification (TD), and a listing of all dehumidification equipment to be installed, supported by equipment data sheets.

- Details about energy recovery equipment installed as part of the ventilation system.

- A listing of all odor mitigation equipment to be installed. The information provided in the letter must be supported by equipment data sheets available immediately upon request.

Exemptions

Indoor cultivation facilities may be exempt[11] from the regulatory requirements for horticultural lighting, HVAC, and dehumidification systems if they are generating 80% or more of the total annual onsite energy use for all fuels (expressed on a MWh basis) from:

1. a clean or renewable generating source; or

2. renewable thermal generation.

A "clean or renewable resource" should be understood to refer to renewable energy generating sources, as provided in M.G.L. c. 25A, § 11F and regulations promulgated thereunder, or renewable thermal generating sources, as provided in M.G.L. c. 25A, § 11F½ and regulations promulgated thereunder.

As of September 2019, acceptable renewables technologies include the following:

1. Renewable Generation Unit as defined by 225 CMR 14 (https://www.mass.gov/guides/rps-class-i-and-class-ii-statement-of-qualification-application)

    a. Solar photovoltaic or solar thermal electric energy

    b. Wind energy

    c. Ocean thermal, wave, or tidal energy

[11] 935 CMR 500.120(11)(e); 935 CMR 500.120(12)(e).

d. Fuel cells using eligible Renewable Energy Portfolio Standard (RPS) Class I renewable fuel

e. Landfill methane gas

f. Hydroelectric

g. Low-emission, Advanced Biomass Power Conversion Technologies using Eligible Biomass Fuel

h. Marine or hydrokinetic energy

i. Geothermal energy

2. Renewable Thermal Generation Unit as defined by 225 CMR 16 (https://www.mass.gov/guides/aps-renewable-thermal-statement-of-qualification-application)

a. Air-Source Heat Pump

b. Ground Source Heat Pump

c. Deep Geothermal Heat Exchange

d. Solar Thermal

e. Woody Biomass

f. Biogas

g. Liquid Biofuels

h. Compost Heat Exchange System

Additionally, the Cultivation Facility must document that renewable energy credits or alternative energy credits representing the portion of the Licensee's energy usage not generated onsite has been purchased and retired on an annual basis.

In order to demonstrate eligibility for the exemption, a Cultivation Facility must submit an Energy Compliance Exemption Letter, demonstrating exemption as part of Architectural Review.

The letter must be provided by someone with the same qualifications as for the Energy Compliance Letter and include:

1. Description of clean or renewable energy system, including an attestation that the system meets eligibility requirements above. This requirement can be satisfied by providing an RPS or APS Conditional Statement of Qualification approved by the Department of Energy Resources.

3. Energy usage calculations for the facility, supported by building plans and energy models, including inputs and outputs by end use.

4. Clean or renewable energy generation calculations for the facility, supported by building plans and energy models, including inputs and outputs by end use.

5. Written plan on how Renewable Energy Certificates (RECs) or Alternative Energy Credits (AECs) will be generated and retired on at least an annual basis. Note that the option of retiring RECs and AECs is available only to demonstrate the portion of energy usage *not* generated for onsite use (maximum of 20% of total onsite energy usage).

6. HVAC information, including:

    a. Certification from a Massachusetts Licensed Mechanical Engineer that the HVAC and dehumidification systems meet the Massachusetts State Building Code, and that HVAC and dehumidification equipment have been evaluated and sized for the loads of the facility.

    b. Total of TR, thousands of BTUs per hour (MBH), and a listing of all HVAC equipment to be installed. The information provided in the letter must be supported by equipment data sheets available immediately upon request.

    c. Total of TD, and a listing of all dehumidification equipment to be installed, supported by equipment data sheets.

    d. Details about energy recovery equipment installed as part of the ventilation system.

    e. A listing of all odor mitigation equipment to be installed. The information provided in the letter must be supported by equipment data sheets available immediately upon request.

7. Description of an eye safety plan that includes the following:

    a. Safety protocols related to eye safety for those exposed to horticultural lighting;

b. Communication plan for how eye safety protocols will be communicated to employees;

c. Description of how protective eyewear will be provided for anyone coming in to contact with active horticultural lights;

d. Description of signage that will be used to remind workers of eye safety.

e. Affirmation that the safety protocols will be reviewed and updated by the Cultivation Facility on an annual basis.

Operations & Renewal

A Cultivation Facility shall continue to maintain written operating procedures on energy usage for the duration of its operations. Cultivation Facilities should continuously re-evaluate opportunities for energy conservation and the mitigation of their environmental impact as their operations are ongoing.

A Cultivation Facility, whether operated by a Marijuana Cultivator or an MTC, must provide energy and water reporting as part of the annual license renewal requirement.[12] All Cultivation Facilities are subject to this requirement, regardless of whether they file a Letter of Compliance or a Letter of Compliance Exemption. This guidance document outlines the steps that Cultivation Facilities should take to be in compliance with this reporting requirement.

Requirements: Based on the previous 12-month period, a Cultivation Facility must provide energy consumption by fuel (monthly, including consumption and demand), water consumption (gallons per month), on-site energy generation (monthly), and cannabis yield by weight (annual).

Timing: The required information must be included as part of the licensee's completed renewal application as outlined in 935 CMR 500.103(4)(c) and 935 CMR 501.103(4)(c). This information must be included every year that a renewal application is submitted. Please note that if a Cultivation Facility has filed its renewal application prior to July 1, 2020, without complying with the documentation requirements for renewal as described in the regulations and this guidance, but the Commission acts upon the renewal application after July 1, 2020 , a condition will be placed on its renewal that the documentation must be filed within 60 days, unless the licensee has applied for an Energy Reporting Extension (if eligible). All applications for renewal filed on or after July 1, 2020 must include the required documentation.

[12] 935 CMR 500.103(4) and 935 CMR 501.103(4).

Annual Energy and Environmental Reporting

1. Facilities should use the Cannabis PowerScore for annual reporting for electricity consumption. If non-electric fuels, such as natural gas consumption, other delivered fuels or clean or renewable energy generation are not yet available on the Cannabis PowerScore at the time of renewal, facilities may submit monthly usage information in a separate format.

2. It is recommended to create an account on https://www.cannabispowerscore.org by clicking the "sign up" link, this will allow you to save work and return to it later. Creating an account is not required.

3. Complete information about your facility. The more information provided, the more you will learn in comparing to other facilities.

4. On the annual totals page, a Cultivator will provide the following information:

    a. Monthly

        i. Electricity consumption (kWh and KW)

        ii. Natural gas consumption (Therms) (*if available*)

        iii. Other delivered fuels (specify fuel, gallons) (*if available*)

        iv. Water consumption (gallons)

        v. Clean or renewable energy generation (kWh) (*if available*)

    b. Annual

        i. Total cannabis flower and byproduct (grams)

5. Complete your submission.

6. Print final Cannabis PowerScore report and include as part of renewal application. Please ensure the following information is included on the printed submission:

    a. Cannabis PowerScore report number

    b. Production efficiency – grams per kwh

    c. Monthly energy consumption/generation and water usage breakdown

Update Energy Compliance Letter or Energy Compliance Exemption Letter

If any information reflected in the Energy Compliance Letter or Energy Compliance Exemption Letter, including plans or other technical information, has changed, an updated letter and any required supporting documentation must be filed together with the renewal application.

NOTE: Cultivation Facilities that did not submit an Energy Compliance Letter or an Energy Compliance Exemption Letter as part of initial licensure must submit these letters and any other required documentation explained in this guidance at the time of the renewal application, subject to the timing allowances explained above.

Conclusion

Application sections pertaining to energy are reviewed for compliance with 935 CMR 500.000 or 935 CMR 501.000, as applicable, and for completeness. The regulations and guidance are designed to ensure that Cultivation Facilities consider how to optimally use energy early in the facility design process, and continually assess new opportunities for reduce energy usage and costs. Current regulations[13] require that Cultivation Facilities use best management practices to reduce energy and water usage, engage in energy conservation and mitigate other environmental impacts. At this time, the Commission deems compliance with the operational requirements, as described above, to constitute best management practices as related to Cultivation Facilities. Cultivation facilities should maintain policies and procedures addressing all efforts to mitigate environmental impacts, as required under 935 CMR 500.120(12)(e) and 501.120(13)(e).

Applicants will be responsible for complying with any revisions to this guidance that may be issued if legal or regulatory requirements change.

[13] 935 CMR 500.120(11) and 935 CMR 501.120(11) & (12).

Other Resources

License applicants can use this guidance to learn more about how to comply with the energy usage requirements set forth in the following sections of 935 CMR 500.000 and 501.000:

- 935 CMR 500.040(3)(c) – Energy and Environmental Leader Award
- 935 CMR 500.103(1)(b) & 501.103(1)(a) – Architectural Review, Energy Letters
- 935 CMR 500.103(1)(f) & 501.103(1)(e) – Provisional License, Energy Letters
- 935 CMR 500.103(4)(c),(d) & 501.103(4)(c),(d) – Renewal, Energy Letters
- 935 CMR 500.105(1)(q) & 501.105(1)(q) – Written Operating Procedures
- 935 CMR 500.105(13)(h) & 501.105(13)(h) – General Operating Requirements / Transporters
- 935 CMR 500.105(15) & 501.105(15) – General Operating Requirements / Energy Efficiency and Conservation
- 935 CMR 500.120(11) – Marijuana Cultivators
- 935 CMR 501.120(11) – Additional Operational Requirements for the Cultivation, Acquisition, and Distribution of Marijuana
- 935 CMR 500.130(3) & (5)(e) – Marijuana Product Manufacturers
- 935 CMR 501.130(3) – Additional Operational Requirements for Handling and Testing Marijuana and for Production of MIPs

C. Grandfathering & Energy Extension Reporting

Grandfathering

For adult-use cultivation facilities, the requirement to comply with the energy efficiency and equipment standards has been in effect as of March 23, 2018. MTCs with a final certificate of registration before March 15, 2018 who sought an adult cultivation license were given an additional 12 months to comply, until March 23, 2019. The regulations were amended again to give these operators an additional 9 months to comply, until January 1, 2020. The Commission has voted to delay enforcement until July 1, 2020 to allow additional time for implementation. The same date applies to cultivation facilities that are co-located medical and adult use. Facilities that are only medical have until January 1, 2021 to comply.

The regulations also permit licensees to apply for a 6-month extension to the deadline if they agree to submit reports to the Commission regarding their energy and environmental impact.

III. Best Management Practices

A. Guidance on Best Management Practices for Water Use

Cannabis, whether in the form of industrial hemp or marijuana, has varying requirements in water and nutrient levels based on the method of cultivation. This document aims to compare the water needs and differences between all methods of cultivation, including removing the plant entirely from natural systems and growing in sealed indoor environments, and the considerations that a grower should be taking into account when locating their facility and establishing watering operations for plant growth and facility maintenance.

***It should be noted that given the lack of research on hemp and marijuana growth in the United States, there is conflicting information on cultivation practices, and the vast differences between methods leads to high amounts of variability. The following numbers are cited but subject to change upon the release of more current regional data.*

Location of Facility and Source of Water

An important consideration for siting of a facility is the availability of water for production. Typically, water for a greenhouse or indoor facility would come from local municipal water or from a regional water supplier like the Massachusetts Water Resources Authority (MWRA). In the case of local municipal water, attention should be paid to whether the water supplier has enough capacity to supply the water both from a source and infrastructure perspective. Depending on the watershed and the specific town the facility is located in, the additional volumes may not be available within the town's registered or permitted amounts, or an Interbasin Transfer[14] approval may be required.

Increased demand on the system may cause a community to seek a new permitted volume which may have additional mitigation requirements. If a grower chooses to develop their own local water supply such as a new well, it is recommended that they contact the local Massachusetts Department of Environmental Protection (MassDEP) office for guidance on new source approval. A marijuana cultivation facility could trigger the Water Management Act's permitting requirements if it pumps from its own water sources more than an average of 100,000 gallons per day or more for three consecutive months of the year, or more than nine million unregistered gallons over any three-month period. In addition, an ME that is supplying its own potable water and has a restroom that is accessible to 25 or more people 60 or more days per year is considered

[14] For information about the Interbasin Transfer Act and Application materials: https://www.mass.gov/interbasin-transfer-act

a Public Water System and would need to obtain an approval. A permit application will need to be filed with MassDEP before operations commence.

Water Use

It is also important to know and understand that prior to establishing your facility, you will need to consider how much water you may use. If your water source is public then you must consider that the city or town you are operating in has a limited amount of water it is allocated to use per year.[15] This information may be useful when you are preparing for and going through the state licensing process and local permitting and/or licensing process.

Seeds vs. Clones

Literature does not currently provide an in-depth analysis of the water necessities of an individual plant, but there is significant evidence to indicate that seeds require less water than clones regardless of the cultivation setting. Seeds are hardier and more resistant to stress and disease, and even though they need more water initially, the growing period for seeds is shorter than that of clones. Clones, while providing insurance for an exact chemical profile upon maturity, require more nutrients which are usually mixed in a water solution.

Outdoor Cultivation

Water requirements for outdoor cultivation vary widely by region, variety, and planting date. As outdoor large-scale cultivation of cannabis is new to Massachusetts, there is no data yet to confirm exact amounts of water required. Studies have shown, however, that the ranges can vary between 12-15" in British Columbia to 20-30" in Europe.[16] This equates to about six gallons per plant per day,[17] which is about twice as much as is required by grapes in California, but not as much as cotton in Georgia (10 gallons/day).[18]

Notably, cannabis requires that most of its water be received by the plant within the first six weeks of cultivation, while metrics generally list watering averages over the lifespan of the plant.

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[15] https://www.mass.gov/lists/massdep-water-management-act-laws-regulations-policies-and- guidance
[16] Nelson, R. A. (2000). *Hemp Husbandry*, https://www.hempbasics.com/hhusb/hh2cul.htm
[17] Bauer S, Olson J, Cockrill A, van Hattem M, Miller L, et al. (18 March 2015) Impacts of Surface Water Diversions for Marijuana Cultivation on Aquatic Habitat in Four Northwestern California Watersheds. Plos One 10(9): e0138935. https://doi.org/10.1371/journal.pone.0137935
[18] Bednarz, C., et. al. (2003). *Cotton crop water use and irrigation scheduling*, http://www.ugacotton.com/vault/rer/2003/p72.pdf

Flowering of the plant significantly decreases water uptake. Within that six-week period, it is critical that the plant experience neither drought nor flooding. Dry conditions hasten maturity and stunt the growth of the plant, whereas puddled areas of a field will kill seedlings within two days if not drained appropriately. Soil composition and conditions play a critical role in this. It should also be noted that varieties respond differently across agricultural regions, with variability in height, biomass, and chemical composition. It has been found that it may take up to three years to develop a localized strain that is acclimatized to the conditions set forth in the region.

Indoor Cultivation

Indoor cannabis cultivation is generally referred to as the process of removing the crop completely from natural conditions such as sunlight, soil, and air and substituting those elements with artificial alternatives. The benefit of indoor growing lies in being able to control the elements of the plant's environment and be able to produce multiple harvests in a year. This method of growing is much more intensive in its usage of energy, water, and chemicals. There are many different methods of cultivating the plants themselves. These methods include:

- Hydroponics (water medium)
- Pots/trays (soil medium)
- Aeroponics (plant suspended on wall, not as common)

In the more typical methods of cultivation (namely soil and hydroponics), medical marijuana studies have estimated that indoor grows require watering in quantities of 98"/room-year, or 40 gallons/room-day (one room = 250 sq. ft.).[19] Hydroponically grown cannabis is much more water intensive than other crops. When grown indoors, however, facilities have the capacity to set up recycling systems that clean and filter used water to be recycled back into irrigation; which helps negate the amount of freshwater input into the system. Treating water and reusing treated water are activities that are regulated by MassDEP and require permits.[20] This water would need to be changed periodically, and nutrient levels can reach unusable points for the plants if not applied correctly.

[19] O'Hare, M., et. al. (7 September, 2013). *Environmental Risks and Opportunities in Cannabis*, https://lcb.wa.gov/publications/Marijuana/SEPA/5d_Environmental_Risks_and_Opportunities_in_Cannabis_Cultivation.pdf

[20] https://www.mass.gov/lists/massdep-wastewater-discharge-and-reuse-regulations

Generally, for non-cannabis crops, indoor cultivation facilities with natural sun and/or ventilation present appear to provide a more balanced method of cultivation, as they are less energy and water intensive than a sealed indoor facility.

Monitoring and Reporting

Water is a crucial resource in the growth of cannabis and in the functioning and operations of cannabis growing facilities. In addition to plant needs, water is also used for heating, processing, sanitary purposes, and landscaping on the property. Minimizing water loss from leaks as well as monitoring total water use as a compliment to instituting best management practices help advance the water conservation goals of the Commonwealth.

Growers should:

- install water meters;
- conduct regular water audits to determine the amount and location of water use;
- develop and implement a water savings strategy; and
- repair all leaks as quickly as possible.

Water Application Methods

Several different methods of water application are used as standards in the horticultural industry. Whereas outdoor fields rely mostly on rainfall or irrigation in cases of drought, indoor facilities must install their own application systems. The most commonly used methods are as follows:

Flood tables utilize large, shallow tables that flood usually on an automated system and provide a layer of water and/or nutrients to plants growing in hydroponic mediums. Large amounts of water are used for this method, but the water can be recycled through the system and used again after treatment via filtration and cleaning.

Drip watering involves irrigation systems that feed directly to each plant through thin drip tubes. The amount of water can be controlled directly or on an automated schedule, and virtually eliminates excess water waste or runoff from the plants.

Wick systems employ a reservoir that provides water and nutrients for a plant via capillary action through wicking material. Seedlings and newly vegetating plants are occasionally watered with this method since it is a simple system that does not require machinery or electricity. However, it is insufficient in supplying large plants with greater water needs.

Hand watering is one of the most common practices used since it requires relatively little equipment and expense initially or in maintenance. However, the amount of applied water varies

greatly between applicators and there is a much larger potential for water being wasted through either over application or by missing the plant root systems. If hand watering is being used, the facility should have a good operating procedure on how to hand water.

Aeroponics uses spray nozzles to mist the stem or roots with nutrients. Larger operations will put the stem/root in a channel and have the spray nozzles line the channel, while others may use the bucket system in which the nitrified water and air are maintained in buckets.

Nutrient film technique (NFT) Systems use very shallow nutrient solution that runs downward in a tube or tray toward the reservoir where it is reused. It is best used on smaller plants with short crop cycle.

Water culture systems are systems where plants are suspended so roots hang down in nutrient solution and the reservoir is continually aerated.

Wastewater Disposal

Many indoor facilities utilize water recapture methods to save money and energy in their operations. Depending on the system in place this could be done through drain pipes and lines, ditches, dehumidifiers, or condensation recapture modules. The recaptured water requires treatment if it is to be reapplied to plants to prevent the growth and spread of microbial pathogens and to reduce the amount of ionic and toxic elements that can be introduced to the water through the addition of nutrients. Common practices include carbon filtration, which neutralizes salinity and other inorganic materials in the water, and reverse osmosis, which allows for close to 97% reuptake but produces a brine that is difficult to dispose of. Other chemicals may be added to clean the water before reapplication to reduce microbe levels. Facilities may also employ the use of an aerobic treatment unit to reduce chemical and microbial levels in the returned water to a satisfactory level.[21] Studies have shown that there is no significant difference in plant growth between the use of recycled water versus the use of fresh water.

Even with recapture methods, however, systems need to be flushed on occasion and new water introduced, especially in the event of pathogen outbreaks or from the presence of high levels of salts or ions that could be detrimental to crop growth and development. Water which is not reused must be discharged to a sewer or collected and stored in a certified holding tank for disposal at an approved facility. Note that water which is being disposed of cannot be discharged to an on-site septic system. If wastewater is being discharged out of the facility (e.g., to a Title 5 system, a sewer system, the ground, or surface waters), the proponent must contact their local

[21] Oyama, N. (2005). Recycling of treated domestic effluent from an on-site wastewater treatment system for hydroponics, https://www.ncbi.nlm.nih.gov/pubmed/16104424

MassDEP office to determine if a discharge permit is required. If wastewater is being stored, it must be kept in a holding tank that is permitted by MassDEP (Transmittal Form DEP01).

In other states, this waste has traditionally been disposed through landfills (often with unused cannabis waste material such as leaves and stems chopped up and mixed in to form a slurry) or is considered industrial waste, depending on the method the waste was created and the definition of industrial/hazardous waste by law. In Massachusetts, however, this waste may not be disposed in a landfill. If the waste is combined with unused cannabis waste, it may be composted or sent to an anaerobic digester. As a last resort, if such slurry is sufficiently dewatered, it may be disposed at a landfill so long as the remaining sludge does not contain free-draining liquids and contains a minimum of 20% solids (note that the disposal facility will need advance notice in order to submit the required documentation to MassDEP). If wastewater is being discharged out of the facility (e.g., to a Title 5 system, a sewer system, the ground, or surface waters), the proponent must contact their local MassDEP office to determine if a discharge permit is required. If wastewater is being stored, it must be kept in a holding tank that is permitted by MassDEP (Transmittal Form DEP01). For more information on waste disposal, please refer to the Commission's Guidance on Cannabis Waste Management Requirements (https://mass-cannabis-control.com/wp-content/uploads/2019/04/Guidance-on-Cannabis-Waste-Management-Requirements.pdf).

Best Management Practice Guides

Water use on a crop should strike an appropriate balance between both agricultural needs for water and the need to conserve water. Examples of conservation approaches include proper irrigation scheduling in both timing (daily and seasonal) and volume, control of runoff, the uniform application of water, irrigation technologies, such as drip irrigation (where appropriate), and automated irrigation systems. The Massachusetts Water Conservation Standards[22] (WCS) outline many approaches and best management practices that an agricultural entity should adopt that are environmentally and economically appropriate for their specific operation and site conditions. In addition, the WCS outlines standards and best approaches for indoor water use to ensure high levels of efficiency in structural items such as toilets and other water fixtures. Based on the information gathered above, there are three best management practice categories listed below that are considered high priority and should be implemented, to the greatest extent practicable, by all cannabis growers. These practices, along with some others, can help reduce or mitigate strains to disposal and environmental systems and improve water and energy efficiency as a whole.

[22] Massachusetts Water Conservation Standards (2018), Water Resources Commission. https://www.mass.gov/massachusetts-water-conservation-standards

1. Soil health

    - Determine the soil needs and develop a soil health management system to improve the health and function of the soil. Soils are an ecosystem that can be managed to provide nutrients for plant growth, absorb and hold rainwater for use during drier periods, filter and buffer potential pollutants from leaving fields, serve as a firm foundation for agricultural activities, and provide habitat for soil microbes to flourish.

    - Consider using compost to help promote the health of the soil.

    - Maintain adequate soil moisture based on crop needs for optimum plant growth without causing excessive water loss, erosion, or reduced water quality.

2. Watering methods

    - Use water in a targeted, planned, and efficient manner with appropriate amounts and frequency to meet the needs of the crop without excessive water loss.

    - Automation of watering systems is critical to reducing water waste and decreasing variability in plant health through overwatering. If automation is not financially feasible, water nozzles and other flow-reducing systems should be put in place to monitor and check flow rates.

    - Micro-irrigation systems, such as subsurface drip irrigation, should be adopted if the facility is designed to be compatible for it.

    - Establish an irrigation schedule based on the specific needs of the crop.

    - Irrigation system efficiency should be evaluated on an annual basis.

    - Where sprinkler systems are used for irrigation, the systems should be capable of uniform application of water with minimal evaporative loss and minimal surface run-off.

3. Water capture and reuse

    - A water recapturing system should be used to recycle and reuse water so as to reduce the total amount of water used. Systems can include ones that capture water from watering the plant and reusing and/or capturing water condensation from the HVAC system.

    - Explore the options of capturing and using rainwater.

4. Other

- Be knowledgeable of the municipal and state laws relative to water use.
- Choose a site that is capable of managing the amount of water that will be used and will not impact other water users.
- Cultivators should consider utilizing greenhouses and outdoor settings to reduce the amount of energy and water required to maintain plant health.
- Monitor and document your water use.
- If cultivating outdoors, growers should be mindful of all other relevant agricultural and environmental protection regulations in place regarding watershed areas, buffer zones, irrigation runoff, erosion control, and soil amendments.
- Ensure that the appropriate dilution rates and application schedules are followed for any nutrients or cleaning solutions that are being used during cultivation or in treating water. Over application can lead to unnecessary contaminant levels in the water or poor plant health and require further treatment, more frequent system

B. Guidance on Best Management Practices for Waste Management

Managing Solid Waste Materials

Like any other business, MEs generate a variety of common waste materials. While some materials need to be disposed of in the trash, others should be recycled or composted. Massachusetts has waste disposal ban regulations (310 CMR 19.017, available at https://www.mass.gov/regulations/310-CMR-19000-solid-waste-facility-regulations) that ban the disposal of certain materials in the trash. Commonly generated waste that is banned from disposal include cardboard, bottles and cans, paper, and leaves and yard waste. You can see more information on the waste bans and what materials are banned from disposal at https://www.mass.gov/guides/massdep-waste-disposal-bans.

Under the waste ban regulations, MassDEP considers cannabis plant material to be "commercial organic material." This material is banned from disposal in the trash if a business generates one ton or more per week for disposal. If an ME generates one ton or more of commercial organic material per week for disposal, it would need to divert this material from disposal, typically to a compost or anaerobic digestion (AD) operation. If an ME generates less than one ton of plant material per week, the material may be disposed of in the trash, although MassDEP still encourages this material to be composted where possible.

Composting or AD

According to 935 CMR 500.105(12), cannabis plant parts and associated materials sent for composting or AD must first be ground and mixed with other organic materials such that the cannabis material is rendered unusable. Other organic materials may include growing media, soil, mulch, food waste, or agricultural material such as manure or other plant materials.

There are no unique requirements for hauling this material to a compost or anaerobic digestion facility. MassDEP does not license or grant permits to waste haulers. The best place to start is to check with the haulers that currently service businesses in the area, though ideally an ME should work with a hauler that has experience hauling other similar organic materials. If you need to find a new hauler, you can search for haulers by material type and location at Recycling Works Massachusetts (https://recyclingworksma.com/about-recyclingworks).

Once on the webpage, select the material type "Food-Waste/Compostables" for cannabis plant materials (note: you can also use this webpage to search for recycling service providers). A hauler can help you determine which facility to deliver your material to, as well as the number and size of containers you need to meet your needs. You can also search for compost or AD facilities that can accept that material using that same link, or by referring to MassDEP's list of sites accepting diverted food material (https://www.mass.gov/doc/map-list-of-massachusetts-sites-accepting-diverted-food-material-june-2019/download).

On-site composting: In some cases, it may work well for an ME to compost materials on site. Composting on site requires sufficient space to construct and maintain a compost pile, as well as additional materials to mix with cannabis plant material to compost successfully. For general guidance on composting practices, please refer to the Massachusetts Department of Agricultural Resources' Composting Guidebook (https://www.mass.gov/files/documents/2017/12/11/Guide%20to%20Agricultural%20Composting.pdf). Under MassDEP's regulations, a business can compost up to 20 cubic yards of material per week on site, but must complete and submit a one-time notification form (https://www.mass.gov/how-to/notification-exempt-recycling-organics-management-activities) to MassDEP and your local board of health. If you are interested in composting on site, you can receive free assistance and guidance through the RecyclingWorks in Massachusetts' Compost Site Technical Assistance Program (https://recyclingworksma.com/learn-more/compost-site-technical-assistance).

Solid waste disposal: The requirements under 935 CMR 500.105(12) for disposing of cannabis waste are similar to those for sending it to composting or AD. The cannabis waste must be ground and mixed with other solid wastes so that the material is rendered unusable. Suitable materials for mixing cannabis wastes for disposal include food waste, coffee grounds, manure, sawdust, or growing media. The best approach is to work with your existing waste hauler to provide this collection service. Cannabis wastes mixed with other solid waste can be brought to any permitted transfer station, landfill (https://www.mass.gov/files/documents/2018/02/06/actlf.pdf), or municipal waste combustion facility (https://www.mass.gov/files/documents/2018/02/06/actcf_0.pdf) for disposal. Your solid waste hauler will typically determine the best nearby facility to deliver the waste to for disposal. A hauler can also help you determine what number and size of containers you need to meet your needs.

Storage, documentation, and recordkeeping: Cannabis wastes should be stored in a secure and locked container and location prior to collection. Under 935 CMR 500.105(12), at least two ME agents must witness and document how the marijuana waste is handled. The same regulation requires your business to develop and maintain records for at least three years that include:

1. How the cannabis waste is secured prior to collection;
2. The date the material is sent for composting, anaerobic digestion, or disposal;
3. The type and amount of material managed;
4. The name, location, and type of facility to which the material was delivered;
    - (The facility can provide a scale or load ticket that includes all of this information.)

5. The manner of disposal or handling; and

6. The names and signatures of the two agents who witness the material management.

This three-year period is extended for the duration of any enforcement action and also may be extended by an order of the Commission.

Hazardous waste management: MEs may also generate some wastes that need to be managed as hazardous wastes. This may include: spent lighting, pesticides, solvents, used oil, or other chemicals used in facility operation and maintenance.

Massachusetts hazardous waste regulations (314 CMR 30.000, https://www.mass.gov/regulations/310-CMR-30000-massachusetts-hazardous-waste-regulations) include provisions governing storage (how much material and for how long), labeling, manifest, transportation, and final management and disposal. If you generate hazardous waste, you will need an EPA ID (https://www.mass.gov/guides/hazardous-waste-generation-generators#obtain-or-modify-an-id-number). Your hazardous waste generator status (https://www.mass.gov/guides/hazardous-waste-generation-generators#obtain-or-modify-an-id-number) determines how much waste you may accumulate at your site at one time, and how quickly you need to ship it off site for recycling or disposal. Please see the MassDEP Hazardous Waste Generation web page (https://www.mass.gov/guides/hazardous-waste-generation-generators) for more information and guidance.

Managing liquid wastes: Liquid waste containing marijuana or by-products of marijuana processing shall be disposed of in compliance with all applicable state and federal requirements. These requirements will depend on how liquid waste from a facility is being managed, whether discharged via a sewer connection, holding tank, or to groundwater or surface water. For more information on the applicable regulations and points of contact for each, please see the links in the Regulation Links and Contacts section below.

Packaging: It is recommended that recyclable and compostable packaging be used for marijuana products. Existing resources relative to packaging include the following:

- For recycling, MassDEP maintains a website with educational guidance: www.RecycleSmartMA.Org. This website summarizes what types of packaging are recyclable at our recycling facilities. For general guidance, see https://recyclesmartma.org/smart-recycling-guide. For more specific questions, you can search the "recyclopedia" using the search bar at the top of the page.

- For compostable packaging, search the internet for organizations that certify compostable packaging. Specifications relative to labeling are available at:
    - https://www.astm.org/Standards/D6400.htm
    - https://www.astm.org/Standards/D6868.htm

Other Resources

Regulation Links & Contacts

For any facility-specific permitting questions, please contact your MassDEP regional office. You can find which MassDEP region you are in using MassDEP's list of environmental protection locations (https://www.mass.gov/orgs/massachusetts-department-of-environmental-protection/locations?_page=1). Links to relevant regulations are as follows:

Massachusetts Waste Ban Regulations – 310 CMR 19.017 (https://www.mass.gov/guides/massdep-waste-disposal-bans)

Massachusetts Hazardous Waste Regulations – 314 CMR 30.000 (https://www.mass.gov/regulations/310-CMR-30000-massachusetts-hazardous-waste-regulations)

Surface Water Discharge Permit Program – 314 CMR 3.00 (https://www.mass.gov/regulations/314-CMR-3-surface-water-discharge-permit-program)

Groundwater Discharge Program – 314 CMR 5.00 (https://www.mass.gov/service-details/the-groundwater-discharge-permitting-program)

Operation, Maintenance and Pretreatment Standards for Wastewater Treatment Works – 314 CMR 12.00 (https://www.mass.gov/regulations/314-CMR-12-operation-maintenance-and-pretreatment-standards-for-wastewater-treatment)

Sewer System Extension and Connection Permit Program – 314 CMR 7.00 (https://www.mass.gov/regulations/314-CMR-7-sewer-system-extension-and-connection-permit-program)

Industrial Wastewater Holding Tanks and Containers – 314 CMR 18.00 (https://www.mass.gov/regulations/314-CMR-18-industrial-wastewater-holding-tanks-and-containers)

For assistance with recycling, running a compost operation, and solid waste management, please contact the RecyclingWorks in Massachusetts Program at (888) 254-5525, by email at Info@RecyclingWorksMA.com, or visit the program website at www.RecyclingWorksMA.com. RecyclingWorks in Massachusetts is funded by MassDEP and administered under contract with MassDEP by the Center for EcoTechnology. The program provides free assistance to Massachusetts businesses on waste reduction, recycling, composting, and best management practices.

C. Guidance on Best Management Practices for Integrated Pest Management

Licensed marijuana cultivators must comply with 935 CMR 500.120(9), which states:

The cultivation process shall use best practices to limit contamination including, but not limited to, mold, fungus, bacterial diseases, rot, pests, pesticides not in compliance with 500.120(5) for use on marijuana, mildew, and any other contaminant identified as posing potential harm.

To help licensed cultivators establish best practices in preventing pests and contamination, this guidance serves to assist growers in creating an integrated pest management plan.

The Plant – *Cannabis sativa L*[23]

Cannabis can be grown outdoors as a field crop, indoors in greenhouses, or in grow rooms. Each cultivation method has specific pest and disease problems that may arise due to the different conditions presented by each setting. For example, the high humidity environment of a grow room provides ideal conditions for fungal pathogens. Cannabis grown outdoors may be susceptible to vertebrate pests such as deer and mice as well as larger insect pests, such as stem borers. Whether the cannabis crop is grown indoors or outdoors, cultivators should be prepared with the knowledge to prevent, identify, and control pests using Integrated Pest Management.

Integrated pest management (IPM) is an approach to pest control that applies a combination of methods to manage pest problems. The primary objective of IPM is to prevent, reduce, or maintain pest populations at non-damaging levels by utilizing mechanical, physical, and biological controls to reduce the need for reliance on chemical pesticides. In Massachusetts, IPM is defined under 333 CMR 14.02 as:

> A comprehensive strategy of pest control whose major objective is to achieve desired levels of pest control in an environmentally responsible manner by combining multiple pest control measures to reduce the need for reliance on chemical pesticides; more specifically, a combination of pest controls which addresses conditions that support pests and may include, but is not limited to, the use of monitoring techniques to determine immediate and ongoing need for pest control, increased sanitation, physical barrier methods, the use of natural pest enemies, and a judicious use of lowest risk pesticides when necessary.

[23] Hemp and marijuana are different varieties of the same plant species, *Cannabis sativa L*. For the purposes of this document, the term *Cannabis* refers to marijuana only.

IPM takes advantage of all available pest management strategies. It does not rely on a single pest control method, but rather establishes a way of evaluating the situation and determining the most environmentally safe or ecological solution.

The basic concepts that comprise an effective IPM strategy include:

1. Knowledge
    - Identify the pests: accurate identification of pests is critical in determining the proper methods of control.
    - Establish thresholds to determine when and if action is required to control pests before they reach damaging levels.
2. Prevention
    - Inspect/quarantine plants entering closed environments to ensure you are not bringing in pests.
    - Maintain controlled environments to inhibit growth of plant pathogens.
    - Reduce habitat for potential pests such as poor drainage, standing water, or overgrown vegetation/weeds.
3. Monitoring
    - Scout crops for evidence of pest damage. Use pest traps (like pheromone traps or yellow sticky cards) to determine presence and levels of insect pests.
4. Intervention
    - If intervention is required to control pests, evaluate all the options to determine the least risky and most effective controls available, including cultural, mechanical, biological, and/or chemical methods.

This document is not intended to provide comprehensive IPM recommendations for every cannabis pest; rather, it should serve as a basic guideline and assist cultivators with development of an IPM plan for their crop.

Pesticide Use in Cannabis

As cannabis remains prohibited by federal law, the United States Environmental Protection Agency (EPA) does not allow for the use of any registered pesticides in cannabis. Massachusetts pesticide laws follow federal laws, and thus registered pesticides cannot be applied to cannabis in Massachusetts. The Massachusetts Department of Agriculture has published an advisory (https://www.mass.gov/files/documents/2018/10/19/Pesticide%20Advisory.pdf) regarding the use of pesticides on cannabis. As a result, cannabis cultivators must rely more heavily on other methods of management, as they have fewer available tools for use in pest control.

Indoor Cannabis Pest Prevention

Growing cannabis indoors is unique from other cultivation practices in that environmental factors such as ventilation and light are not naturally occurring. Instead, these inputs are produced and controlled by equipment. As with other crops, however, IPM starts with pest prevention. It is recommended to design and operate facilities to prevent the introduction and spread of pests.

Recommendations for indoor pest prevention include:

1. Keeping plants healthy: Healthy plants are more readily able to fight off pests or infections.

2. Sanitation: Keep your facility clean and organized. Seal potential points of entry for pests including cracks, crevices, and voids. Establish protocols to prevent pests from entering the facility on workers' clothing, shoes, or equipment.

3. Quarantine: Inspect all new plant material entering your facility for signs of infestation. Keep new plant material in a separate space for several days to ensure that signs of infestation do not present.

4. Maintain environmental conditions to minimize optimal pest habitat: Ensure humidity levels are appropriate and do not promote pathogen growth. Prevent standing water from forming and ensure that any reservoirs are sealed and filtered.

5. Inspections/monitoring: Regularly inspect plants for signs or symptoms of pest infestations. Place traps like yellow sticky cards in strategic locations to help detect early infestations of flying insect pests.

Outdoor Cannabis Pest Prevention

Cannabis grown outdoors is susceptible to a wide variety of pests including deer, insects, and fungi. Outdoor environments, by nature, are not as well controlled as indoor, and exclusion/prevention practices may be less effective against certain pests. In addition, the use of chemical controls is restricted, so cultural, mechanical, and biological controls have increased importance.

Recommendations for outdoor cannabis pest prevention include:

1. Keeping plants healthy: Healthy plants are more readily able to fight off pests or infections.

2. Exclusion: Use fencing or netting to keep out unwanted pests like deer or birds.

3. Sanitation: Inspect all new plant material for signs of infestation. Keep new plant material in a separate location for several days to ensure that signs of infestation do not present.

4. Maintain field conditions to minimize optimal pest habitat: Remove any overgrown vegetation that may harbor insect pests. Prevent standing water and promote plant health.

5. Inspections/monitoring: Regularly inspect the crop for signs or symptoms of pest infestations. Place traps like yellow sticky cards in strategic locations to help detect early infestations of flying insect pests like moths or aphids.

Cannabis Pest Control Actions

Even with a solid preventative program implemented, it is still possible for a cannabis crop to develop a pest problem. The first step once you've discovered a pest problem is to identify your pest. Proper identification of the pest is vital to determining the most effective control strategy.

There are four primary strategies available in a pest management program:

1. Cultural controls: Cultural controls modify the environment to make the cultivation operation an unaccommodating habitat for pests. They involve practices such as adjusting the irrigation schedule to combat root disease, reducing humidity to make the environment less hospitable to pathogenic fungus and shaping the canopy to facilitate superior airflow, or companion plantings to boost the populations of beneficial insects.

2. Mechanical controls: Mechanical controls use physical methods to trap, exclude, and remove pests, such as putting filters on air intakes, placing sticky traps in strategic locations to trap flying pests, removal of diseased plant material, or removal of weeds.

3. Biological controls: Biological controls utilize natural enemies (predators and parasites that deplete the health of a pest population) to directly attack pests. Biological control organisms can be extremely effective at maintaining pest populations below economic thresholds, and preventing infestations from reaching damaging levels.

4. Chemical controls: Chemical controls should be used judiciously in any IPM program. Cannabis cultivators are limited in their options for chemical controls since Massachusetts prohibits the use of any pesticide with an EPA registration number. While there are minimum-risk (25(b)) pesticides available for use in cannabis cultivation, pesticides in general should not be used as a primary pest control method in cannabis.

Questions? If you have additional questions regarding the Energy and Environment Compiled Guidance, please contact the Commission at Commission@CCCMass.com or (774) 415-0200.

IV. Appendices

A. Appendix A: Checklists for Energy Compliance

I. Application

a. Basic Requirements for Applicants Other than Transporters & Delivery

1. Identification of potential energy-use reduction opportunities (such as natural lighting and energy efficiency measures), and a plan for implementation of such opportunities;

    - Description of how the ME/MTC will monitor energy consumption and make adjustments to operations based on energy usage data;

    - Procedures for identifying energy savings opportunities as part of any facility upgrades, renovations, or expansions; and

    - Procedures for identifying energy savings opportunities when equipment fails and needs to be replaced.

2. Consideration of opportunities for renewable energy generation, including, where applicable, submission of building plans showing where energy generators could be placed on the site, and an explanation of why the identified opportunities were not pursued, if applicable;

    - Description of how the ME/MTC will make energy supply decisions and regularly evaluate renewable options;

    - Procedures for identifying renewable or alternative energy opportunities as part of any facility upgrades, renovations, or expansions; and

    - Procedures for identifying renewable or alternative energy opportunities when equipment fails and needs to be replaced.

3. Strategies to reduce electric demand (such as lighting schedules, active load management, and energy storage); and

    - Description of how the ME/MTC will monitor energy demand and make adjustments to operations based on data; and

    - Procedures for participation in load curtailment, energy storage, or other active demand management programs (as applicable).

4. Engagement with energy efficiency programs offered pursuant to M.G.L. c. 25, § 21, or through municipal lighting plants.

    - Description of how the applicant will incorporate regular engagement with energy efficiency programs (account representative, vendors, etc.) to ensure awareness of new opportunities and incentives.

b. Basic Requirements for Transporters & Delivery

- Applicant must describe how it will make fleet decisions and affirm that it will regularly evaluate alternative fuel vehicle options.

c. Additional Requirements for Cultivation Facilities

- How the cultivator will ensure on a regular basis that equipment is maintained, calibrated, and operating properly, including maintaining operations manuals and operating procedures for all major energy-using equipment – including, but not limited to, horticultural lighting, HVAC systems, dehumidification systems.

II. Architectural Review

a. Basic Requirements for Applicants Other than Transporter & Delivery

1. Identification of potential energy-use reduction opportunities (such as natural lighting and energy efficiency measures), and a plan for implementation of such opportunities;

    - Information demonstrating actual consideration of energy reduction opportunities, including a list of energy reduction opportunities that were considered.

    - Information about whether opportunities are being implemented, will be implemented at a later date, or are not planned to be implemented.

    - Summary of information that was considered to make the decision (i.e. costs, available incentives, and bill savings). NOTE: submission of a Mass Save® or MLP audit report or rebate applications is sufficient to demonstrate compliance.

2. Consideration of opportunities for renewable energy generation, including, where applicable, submission of building plans showing where energy generators could be placed on the site, and an explanation of why the identified opportunities were not pursued, if applicable;

    - Information should be submitted to demonstrate actual consideration of renewable energy generation opportunities, including a list of renewable or alternative energy reduction opportunities that were considered.

    - Information about whether opportunities are being implemented; will be implemented at a later date; or are not planned to be implemented.

    - A summary of information that was considered to make a decision (i.e. costs, available incentives, and bill savings).

3. Strategies to reduce electric demand (such as lighting schedules, active load management, and energy storage);

    - Information should be submitted to demonstrate actual consideration of demand reduction opportunities.

    - Information about whether opportunities are being implemented, will be implemented at a later date, or not planning to be implemented.

    - A summary of information that was considered to make a decision (i.e. costs, available incentives, and bill savings). NOTE: submission of a Mass Save® or MLP audit report or rebate applications is sufficient to demonstrate compliance.

4. Engagement with energy efficiency programs offered pursuant to M.G.L. c. 25, § 21, or through municipal lighting plants.

    - Information should be submitted to demonstrate actual engagement with energy efficiency (Mass Save® or MLP) programs and any financial incentives received. NOTE: submission of a Mass Save® or MLP audit report or rebate applications is sufficient to demonstrate compliance.

b. Basic Requirements for Transporter & Delivery

- Narrative describing the process the Transporter or Delivery operation used to select vehicles to be used in operations.

- If alternative fuel vehicles are not being used, detailed explanation of why other vehicle fuel sources were selected.

- A description of any other energy and water conservation strategies employed at the physical facility for the Transporter and Delivery operation (e.g. garage, dispatch) should also be included.

c. Additional Requirements for Cultivation Facilities: Energy Compliance & Energy Compliance Exemption Letters

1. Who needs to sign the letter?

   For Indoor Marijuana Cultivators, Medical Marijuana Treatment Centers – the letter must be signed by a:

   - Massachusetts Licensed Professional Engineer; or
   - Massachusetts Licensed Registered Architect.

   For Microbusinesses or Craft Marijuana Cooperatives with a cultivation location sized as Tier 1 or Tier 2, or such other Marijuana Cultivators meeting the requirements of 935 CMR 500.850 for a waiver:

   The letter must be signed by a:

   - Massachusetts Licensed Professional Engineer;
   - Massachusetts Licensed Registered Architect;
   - Certified Energy Auditor certified by the Association of Energy Engineers; or
   - Certified Energy Manager certified by the Association of Energy Engineers.

   Please note: The HVAC & dehumidification systems portion of the letter must be separately completed and signed by a:

   - Massachusetts Licensed Mechanical Engineer; or
   - Professional Engineer with license that covers mechanical engineering.

2. What needs to be in the letter?

   Energy Compliance Letters or Energy Compliance Exemption Letters must include, at a minimum, the information required below.

- Letter Demonstrating HLPD Compliance

  The letter must include the following information:

  - *Building Envelope*

    - Narrative confirming compliance with 935 CMR 500.120(11)(a) or 935 CMR 501.120(11)(a), as applicable; and

    - The output from COMcheck™ software used to show building envelope compliance with State Building Code, 780 CMR.

  - *HLPD Lighting (you should select either HLPD or HQPL, not both)*

    - If the applicant chooses the HLPD compliance path, the letter must include the calculations that show compliance with the HLPD requirements;

    - Narrative explanation of how the facility complies with 935 CMR 500.120(11)(b) or 501.120(12)(b), supported by copies of the facility lighting schedule, square footage of canopy, description of horticultural lighting equipment, number, type and wattage of all HLE;

    - Cutsheets for all HLE to be submitted as part of the Architectural Review;

    - Detailed identification of the stamped plans showing the layout of all HLE, which means any lighting equipment (e.g. fixtures, bulbs, ballasts, controls, etc.) that uses energy for the cultivation of plants, at any stage of growth (e.g. germination, cloning/mother plants, propagation, vegetation, flowering, and harvest), such plans must be available immediately upon inspection and two copies of the plans must be available for immediate surrender upon request;

    - Detailed identification of the stamped plans showing the areas considered as HLSF, such plans must be available immediately upon inspection and two copies of the plans must be available for immediate surrender upon request;

    - Description of eye safety plan that includes the following:

      - Safety protocols related to eye safety for those exposed to horticultural lighting;

- Communication plan for how eye safety protocols will be communicated to employees;

- Description of how protective eyewear will be provided for anyone coming in to contact with active horticultural lights;

- Description of signage that will be used to remind workers of eye safety; and

- Affirmation that the safety protocols will be reviewed and updated by the Marijuana Cultivator or MTC on an annual basis.

- *HQPL Lighting (you should select either HLPD or HQPL, not both)*

  - Narrative explanation of how the facility complies with 935 CMR 500.120(11)(b) or 501.120(12)(b), supported by copies of the facility lighting schedule, square footage of canopy, description of horticultural lighting equipment, number, type and wattage of all HLE;

  - Cutsheets for all HLE to be submitted as part of the Architectural Review;

  - Description of eye safety plan that includes the following:

    - Safety protocols related to eye safety for those exposed to horticultural lighting;

    - Communication plan for how eye safety protocols will be communicated to employees;

    - Description of how protective eyewear will be provided for anyone coming in to contact with active horticultural lights;

    - Description of signage that will be used to remind workers of eye safety; and

    - Affirmation that the safety protocols will be reviewed and updated by the Marijuana Cultivator or MTC on an annual basis.

- *HVAC & Dehumidification Systems*
    - Certification from a MA Licensed Mechanical Engineer that the HVAC and dehumidification systems meet Massachusetts building code, and that HVAC and dehumidification equipment have been evaluated and sized for the loads of the facility;
    - Total of TR, thousands of BTUs per hour (MBH), and a listing of all HVAC equipment to be installed, supported by equipment data sheets;
    - Total of TD, and a listing of all dehumidification equipment to be installed, supported by equipment data sheets;
    - Details about energy recovery equipment installed as part of the ventilation system; and
    - A listing of all odor mitigation equipment to be installed, supported by equipment data sheets.

- Letter Demonstrating Compliance Exemption
    - *Eligible Technologies*
        - Renewable Generation Unit as defined by 225 CMR 14:
            - Solar photovoltaic or solar thermal electric energy;
            - Wind energy;
            - Ocean thermal, wave or tidal energy;
            - Fuel cells using eligible RPS Class I renewable fuel;
            - Landfill methane gas;
            - Hydroelectric;
            - Low-emission, Advanced Biomass Power Conversion Technologies using Eligible Biomass Fuel;
            - Marine or hydrokinetic energy; or
            - Geothermal energy.

- Renewable Thermal Generation Unit as defined by 225 CMR 16:
    - Air-Source Heat Pump;
    - Ground Source Heat Pump;
    - Deep Geothermal Heat Exchange;
    - Solar Thermal;
    - Woody Biomass;
    - Biogas;
    - Liquid Biofuels; or
    - Compost Heat Exchange System.

- *Narrative Contents of Letter*
    - Description of clean or renewable energy system, including an attestation that system meets eligibility requirements above. This requirement can be satisfied by providing an RPS or APS Statement of Qualification approved by the Department of Energy Resources.
    - Energy usage calculations for the facility, supported by building plans, energy models, and energy model outputs, including inputs and outputs by end use;
    - Clean or renewable energy generation calculations for the facility, supported by building plans and energy models, including inputs and outputs by end use; and
    - Written plan on how RECs or AECs will be generated and retired on at least an annual basis. Note that the option of retiring RECs and AECs is available only to demonstrate the portion of energy usage *not* generated for onsite use (maximum of 20% of total onsite energy usage).
    - Description of eye safety plan that includes the following:
        - Safety protocols related to eye safety for those exposed to horticultural lighting;

- Communication plan for how eye safety protocols will be communicated to employees;

- Description of how protective eyewear will be provided for anyone coming in to contact with active horticultural lights;

- Description of signage that will be used to remind workers of eye safety; and

- Affirmation that the safety protocols will be reviewed and updated by the Marijuana Cultivator or MTC on an annual basis.

- *HVAC & Dehumidification Systems*

  - Certification from a MA Licensed Mechanical Engineer that the HVAC and dehumidification systems meet Massachusetts building code, and that HVAC and dehumidification equipment have been evaluated and sized for the loads of the facility;

  - Total of TR, thousands of BTUs per hour (MBH), and a listing of all HVAC equipment to be installed, supported by equipment data sheets;

  - Total of TD, and a listing of all dehumidification equipment to be installed, supported by equipment data sheets;

  - Details about energy recovery equipment installed as part of the ventilation system; and

  - A listing of all odor mitigation equipment to be installed, supported by equipment data sheets.

d. Additional Requirements for Cultivation Facilities: Third-Party Safety Certification

- Third-party safety certification for lighting products by an OSHA, NRTL, or SCC-recognized body, which shall certify that the products meet a set of safety requirements and standards deemed applicable to horticultural lighting products by that safety organization.

III. Renewal

- Cannabis PowerScore
- Update Energy Compliance Letter or Energy Compliance Exemption Letter

B. Appendix B: DLC Horticulture QPL Process

Finding qualified lighting products on the DLC Horticultural QPL
Draft date: November 5, 2019

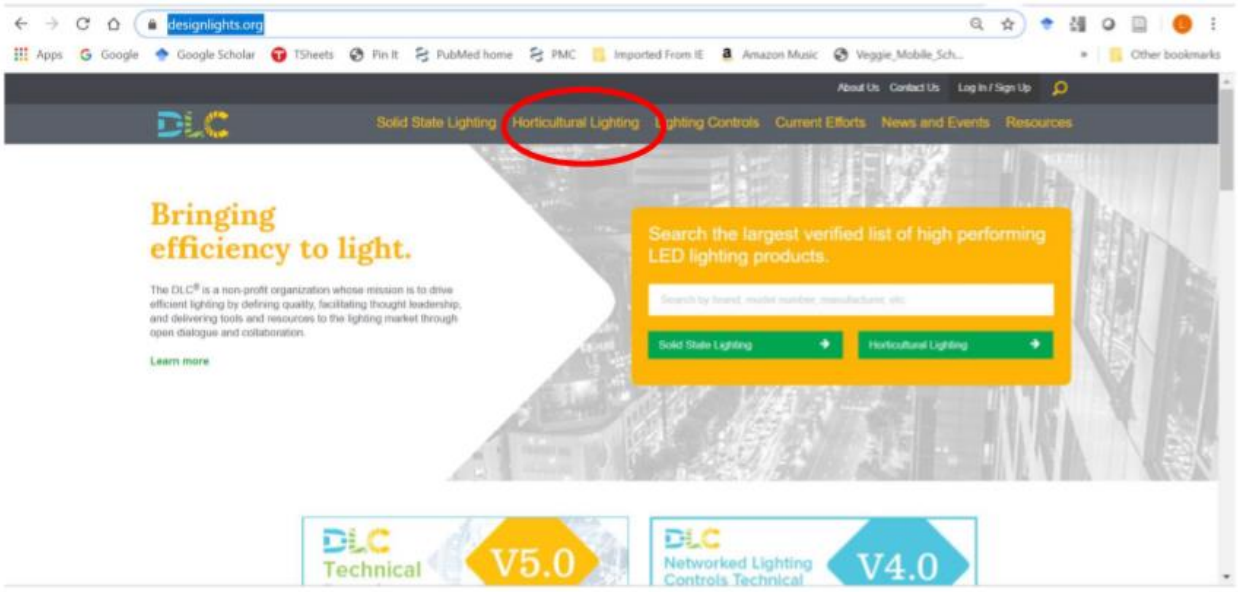
The Commission recently updated its regulations so that qualified LED lighting fixtures on the DesignLights Consortium (DLC) Horticultural Qualified Products List (QPL) can be used to comply with the minimum Commission Photosynthetic Photon Efficacy (PPE) metric.

The current baseline PPE for LED lighting fixtures on the DLC Horticultural QPL is 1.9 micromoles per Joule (µmol/J). The Commission regulations stipulate that the "lighting Photosynthetic Photon Efficacy (PPE) is at least 15% above the minimum Horticultural QPL threshold rounded up to the nearest 0.1 µmol/J (micromoles per joule)." This equates to a minimum Commission PPE requirement of 2.2 µmol/J (1.9 x 1.15 = 2.19, which rounds up to 2.2).

To find products that are on the DLC Horticultural QPL with PPEs of at least 2.2 µmol/J, follow these steps:

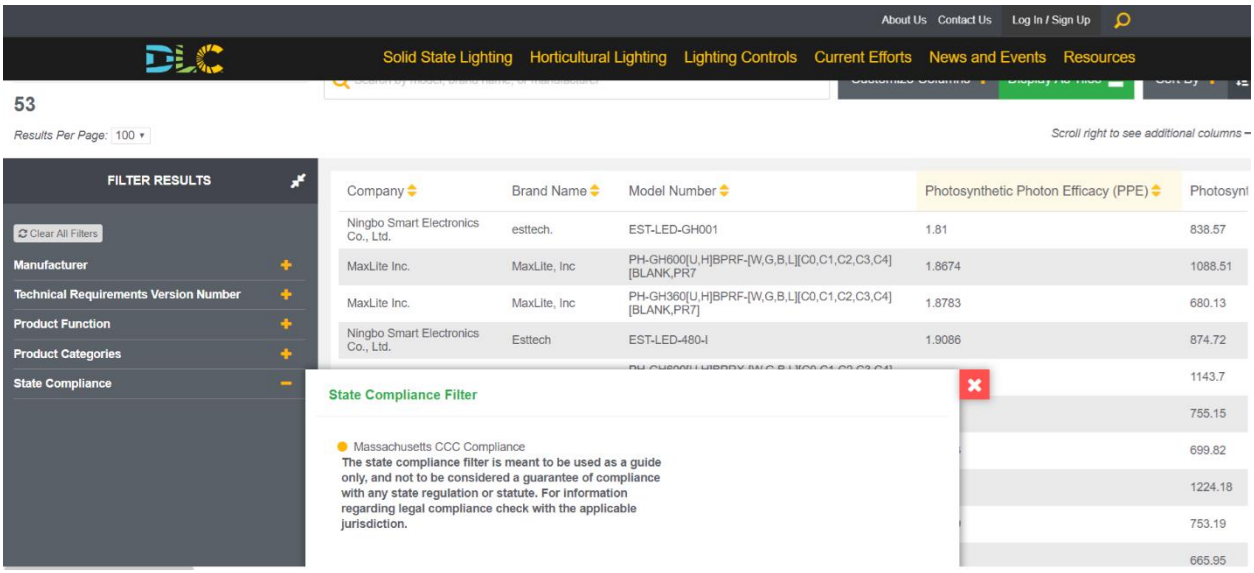
1. Go to http://www.designlights.org

2. Click on "Horticultural Lighting"

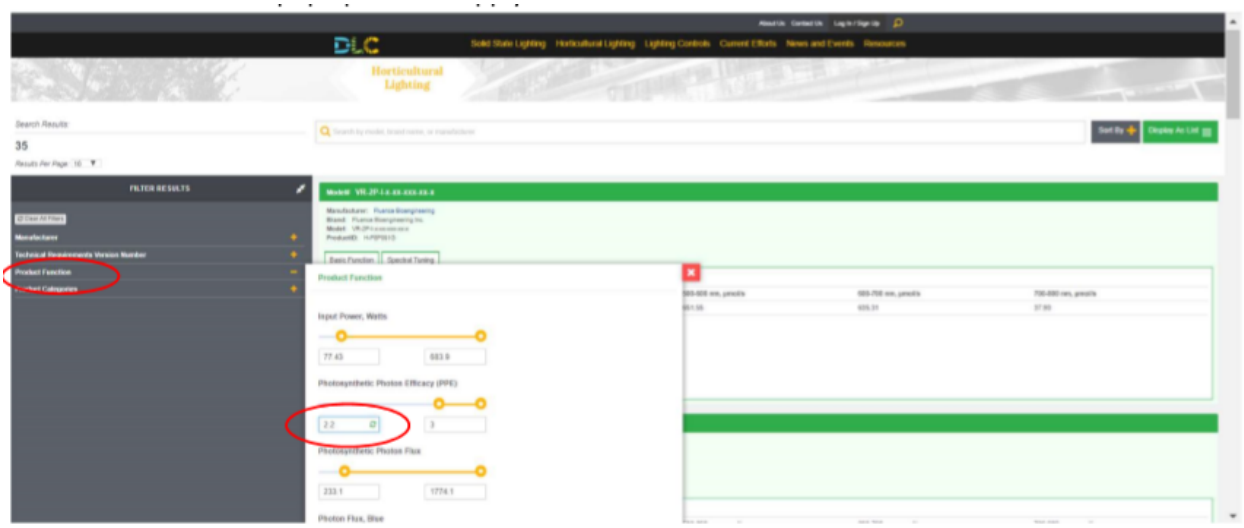


3. On the left side of the web page, click on the “Horticultural Lighting QPL” link

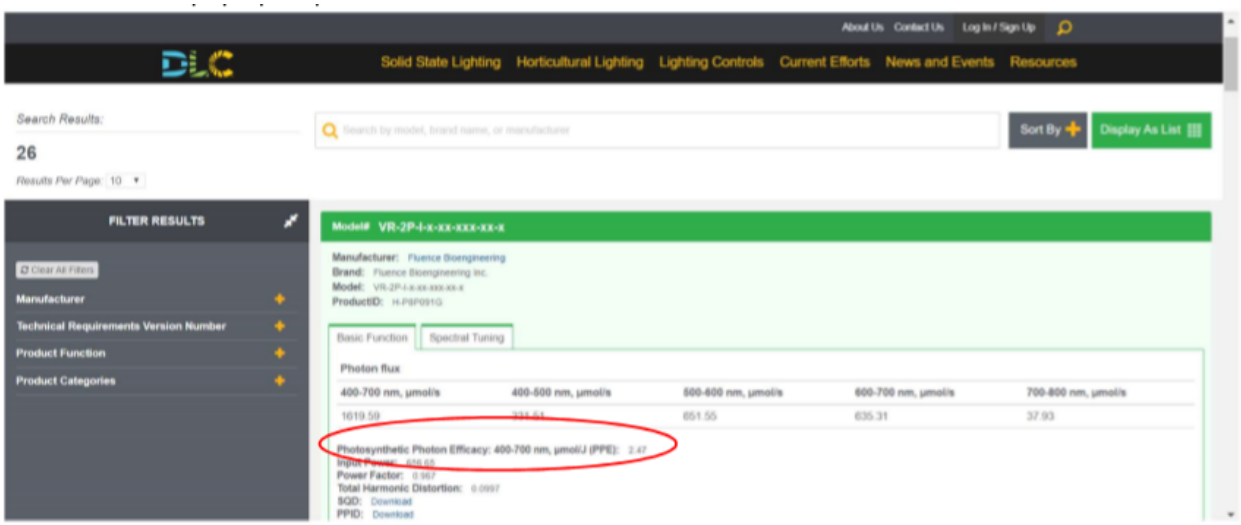
4. All qualified lighting products will be shown in the Tile format by default. To filter products for Massachusetts state compliance, click on “State Compliance.” Click out of the pop-up form to apply the filter.



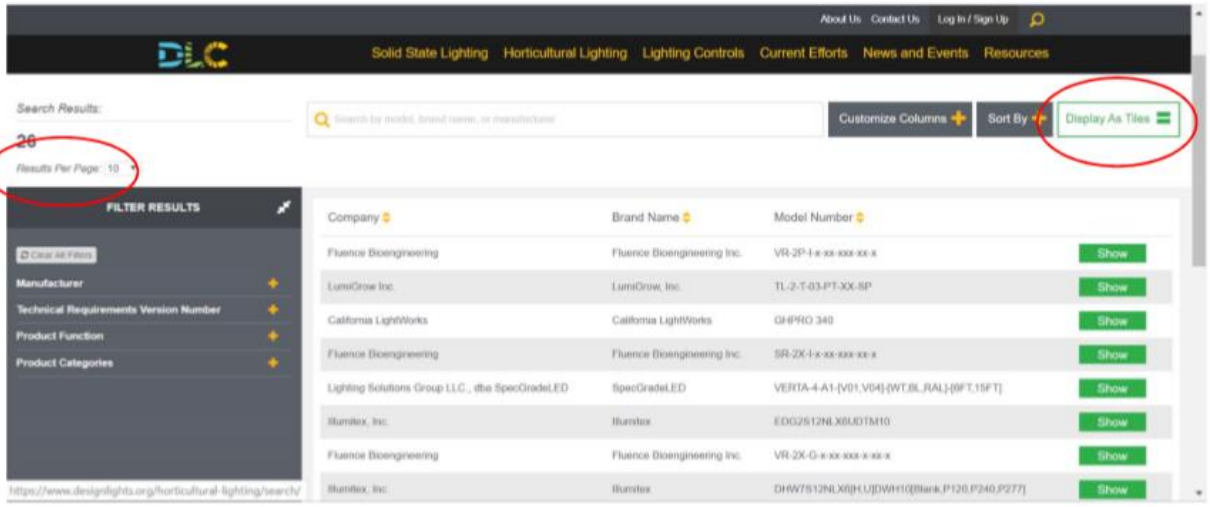
5. Alternatively, to filter products by a specific minimum PPE, first click on the "Product Function" filter on the left side of the web page, then in the pop-up form, change the minimum PPE Filter Value to 2.2. Click out of the pop-up form to apply the filter. The number of qualifying products that meet or exceed the minimum PPE = 2.2 will be shown (26 as of November 5, 2019).



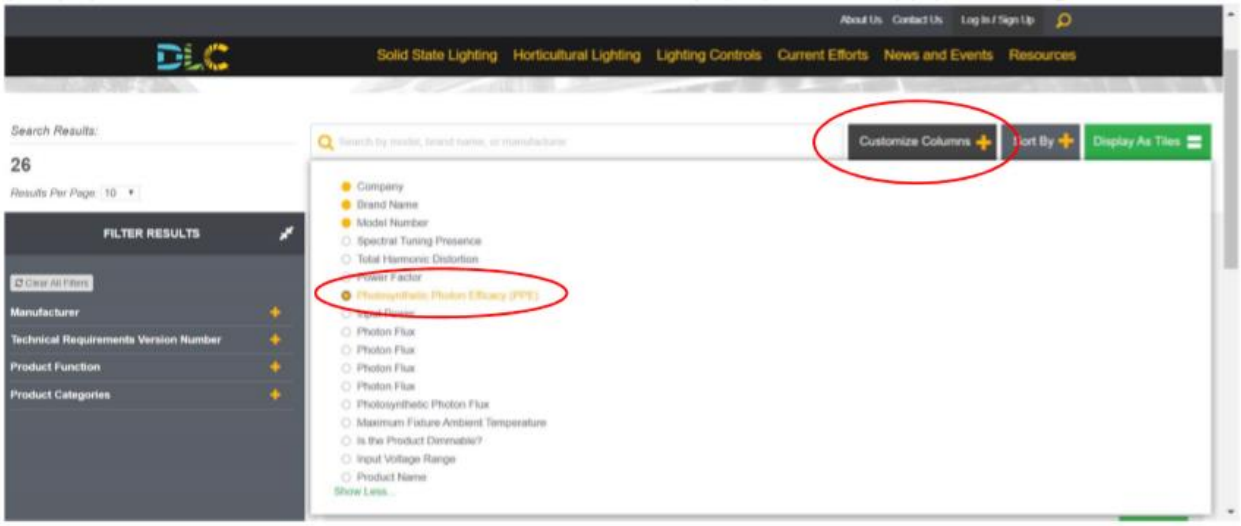
6. In the Tile view, the tested PPE for each qualifying product is shown in the Basic Function tab. You can change the Tile display order by sorting by various QPL metrics (click the "Sort By" button to see a pop-up list).



7. To review all the PPE values in a list format, click on the “Display as List” button on the upper right portion of the QPL web page. The qualifying products will be displayed 10 at a time. To see more products at once, change the “Results per Page” value to 20, 50, or 100.



8. To view the tested PPE value for each product, click on the “Customize Columns” button. From the pop-up form, click on “Show More… link.” Then, click on the PPE option to add this column to the list. Click out of the pop-up form to apply the changes.



9. You can change the sort order of the columns by clicking on the column title. You can see more about each product by clicking on the Show button.